

March 2004 Report of the Tevatron BPM Upgrade
wbs item 1.3.4.6.4
Bob Webber, Stephen Wolbers
April 13, 2004

Project Manager's Summary:

In March there was progress on many fronts. The front-end analog signal processing specification and design work continues. This is a very important part of the project and there are many things that need to happen before the final production systems can be built, tested, and installed in the Tevatron. Multiple updates on the layout of the VME crate and associated modules, timing system, diagnostics system, have been given. Decisions have been made that led to a final specification of the VME crate and a change to the front connectors of the EchoTek board to smb-style.

A small group led by Ken Treptow and including Marv Olson, Stew Bledsoe and Bakul Banerjee was appointed as the "Service Building Task Force". Their job was to carefully and completely specify the space, power, Ethernet, etc. availability in the 27 service buildings where the new Tevatron BPM system will be housed. The fieldwork was completed very quickly during the shutdown and the results (drawings, photos, etc.) will be posted on the web. Already the information is helping the project define the installation and commissioning strategy.

Work continued on understanding the capability of the new system to measure anti-proton positions. A special proton scan was made to help to measure the proton signal feedthrough to the antiproton pickups on the BPMs. This information will help to characterize the capabilities of the system in this mode and Rob Kutschke has written up the work.

The front-end, online and offline software efforts are all proceeding. The front-end software specification has been completed with the important caveat that the diagnostics and calibration has yet to be included. This will occur as soon as the information about how the project plans to do the diagnostics and calibrations is available. The online software specification document has had two iterations. The offline software specification document is expected shortly.

Resources Used in March 2004:

The total number of FTE-months devoted to the project in calendar March 2004 in the Computing Division was reported to be 7.6 FTE-months, and 15 people contributed. Estimated effort expended in the Accelerator Division was 2.1 FTE-months, and 6 people, in March 2004. The total effort from both Divisions was 9.7 FTE-months. The following table gives the estimated or reported effort for both divisions (in FTE-months) since August of 2003.

<u>Month</u>	<u>AD Effort</u>	<u>CD Effort</u>	<u>Total Effort</u>
August, 2003	1.2	2.3	3.5
September, 2003	1.4	4.1	5.5
October, 2003	5.4	6.0	11.4
November, 2003	1.6	5.0	6.6
December, 2003	1.4	4.4	5.8
January, 2004	1.7	5.1	6.8
February, 2004	2.3	6.7	9.0
March, 2004	2.1	7.6	9.7

Purchase requisitions placed in March:

Digital Receiver PO was awarded to Echotek on 3/11/04.

All MVME boards were delivered. We paid \$107,902.64 on 3/15/04.

31 PMC daughter boards were ordered last month. The promised delivery date is 5/1/04.

Milestones:

The project met one major DOE milestone in March:

March 11, 2004: Core electronics PO Complete (EchoTek)

The project wbs will be updated to reflect the new dates for delivery of equipment now that the order has been placed.

Meetings held, Reports Given:

Meetings were held in March on the following dates:

Project Meetings: March 3,4,10,15,17,18,24,25,31

Documents:

The following documents were written and added to the Accelerator Division Document Database in March:

[Beams-doc-860-v22 Tevatron BPM Software Specifications Luciano Piccoli *et. al.*](#) 26 Mar 2004

[Beams-doc-1083-v1 Tevatron BPM Single House Commissioning Plan Jim Steimel](#) 25 Mar 2004

[Beams-doc-792-v4 Minutes from the Tevatron BPM Upgrade Project Meetings Steve Wolbers *et. al.*](#) 25 Mar 2004

[Beams-doc-1065-v3 Tev BPM VME Subrack Specifications Vince Pavlicek](#) 24 Mar 2004

[Beams-doc-988-v2 Cancellation of the Proton Signal on the Antiproton Cable: A Status Report Robert K Kutschke](#) 22 Mar 2004

[Beams-doc-1082-v1 Slides from 3/18/04 Tevatron BPM upgrade meeting Bill Haynes](#) 21 Mar 2004

[Beams-doc-1080-v1 Slides from March 18, 2004 BPM Upgrade meeting Robert K Kutschke](#) 19 Mar 2004

[Beams-doc-1060-v2 Tevatron BPM Online Software Specification Brian S. Hendricks](#) 19 Mar 2004

[Beams-doc-1076-v1 The Position Grid Study from Mar 11, 2004 Robert K Kutschke](#) 16 Mar 2004

[Beams-doc-1070-v1 Tevatron BPM Hardware Specifications Vince Pavlicek *et. al.*](#) 16 Mar 2004

[Beams-doc-1062-v1 TeV BPM Echotek Board: Data from Mar 5, 2004 Robert K Kutschke](#) 16 Mar 2004

[Beams-doc-1071-v1 Preliminary Look at the Grid Study from Mar 11, 2004 Robert K Kutschke](#) 16 Mar 2004

[Beams-doc-1066-v2](#) Pattern of Phases From the TeV BPM Using the Echotek Board
Robert K Kutschke 15 Mar 2004

[Beams-doc-1061-v1](#) Tevatron BPM Upgrade Timing/Diagnostic Design Ideas Bill
Haynes 07 Mar 2004

[Beams-doc-1059-v1](#) Study of Tevatron Shots using the Recycler Echotek Board Robert
K Kutschke 05 Mar 2004

Subproject Leader Reports:

Technical Coordinator: Jim Steimel

The wire measurements of the Tevatron BPM are complete, and measurements of the second order effects correlate nicely with beam measurements. A document describing the work and its results is forthcoming. The test stand at Feynman is now equipped with TCLK and TVBS signals. Also, TVBS injection events and turn-by-turn measurement events are being manufactured. A first draft of the commissioning plan outline was completed, but it did not allow for any significant installations during the August shutdown. A new version that allows for significant installation labor to be performed during the shutdown is nearly complete.

Electronics: Vince Pavlicek

For March, the Electronics group made several presentations to the BPM project proposing the data acquisition hardware and infrastructure in order to refine the design. Interaction with the project continues to refine the subrack wiring, connector details and a small number of functional details within the timing and diagnostic modules. The timing and diagnostic module designs made good progress. The existing AD timing firmware is being converted and adapted to the new hardware. New firmware (actually recycled from other hardware) is being added to implement the diagnostic board link and the VME and EDB interfaces. The hardware specification document is lagging behind the module design due to managerial participation in reviews but that will be remedied soon. A very beneficial meeting between the BPM team and the new BLM team resulted in a much better understanding of the interdependence of the two projects and outlined guidelines that should allow the two projects to work together beneficially but keep the two projects from interfering with the each other's schedules. Support for the FCC test stand was provided to the software group as needed.

Front-end/DAQ software: Margaret Votava

During March we completed an important milestone on the signoff of the front end software specification document (no calibration or diagnostic specs yet though). We have made good progress on the design document and are getting ready for it to be reviewed. During the March shutdown, the TCLK and BSYNC signals were connected to the Feynman teststand. We have confirmed that we see the TCLK signals through the recycler BPM software running on the test crate.

Online software: Brian Hendricks

During this month, I met with the data acquisition software people and Mike Martens to review the online software specification document. This resulted in numerous updates to the document. This document is still evolving in response to comments from others, but it is nearing completion.

Offline software: Rob Kutschke

Throughout March work continued on three main fronts, writing the specifications for the offline software, evaluating test data from the modified Recycler Echotek boards and thinking about how to calibrate the system. An early draft of the specifications document has been circulated and I am scheduling time to discuss it with Brian Hendricks and Mike Martens. Early in the month a test was performed to measure the response of the BPMs when the beam is moved to several locations in a grid pattern. Preliminary results from this exercise show that the BPM is sensitive to the position of the beam in the orthogonal transverse direction. Ignoring this effect introduces an error in the position at the level of a few hundred microns. Final results from the study are in preparation. I spoke with Fritz Dejongh about his work last fall to improve the calibration of the old BPM system. Using this information and the results of measurements made with the modified Recycler Echotek boards, I am preparing a summary of the contributions to the overall accuracy of the device.